TOWARD A LESS FIRE-PRONE CIGARETTE

FINAL REPORT

OF THE

TECHNICAL STUDY GROUP ON CIGARETTE
AND LITTLE CIGAR FIRE SAFETY

CIGARETTE SAFETY ACT OF 1984

September 21, 1987

EXECUTIVE SUMMARY

The Cigarette Safety Act of 1984 created the Technical Study Group on Cigarette and Little Cigar Fire Safety (TSG), directing it to "undertake such studies and other activities as it considers necessary and appropriate to determine the technical and commercial feasibility, economic impact, and other consequences of developing cigarettes and little cigars that will have a minimum propensity to ignite upholstered furniture or mattresses." Lower ignition-prone cigarettes would significantly reduce fire losses. Since its formation in January, 1985, the TSG has carried out a program of consultation, deliberation, and research. This text is the final report on that program.

The Technical Study Group finds that it is technically feasible and may be commercially feasible to develop cigarettes that will have a significantly reduced propensity to ignite upholstered furniture or mattresses. Furthermore, the overall impact on other aspects of the United States society and economy may be minimal. Thus it may be possible to solve this problem at costs that are less than the potential benefits, assuming the commercial feasibility of the modified cigarettes.

The particular conclusions of this study are as follows:

- There are cigarette characteristics whose variations in the laboratory reduced the ignition propensity of the cigarette. These are: reduced circumference, lower density tobacco, less porous paper, and reduction of citrate addition to the paper. Considerably larger reductions were achieved with combinations of these. Several patented approaches also offer directions for further investigation. Limited evidence suggests the presence of a filter may also have some effect on ignition propensity.

- The differences in ignition propensity among selected current commercial cigarettes are unimportant.

- Measurements of cigarette ignition propensity on upholstered furniture mockups are reasonable indicators of performance on full-scale furniture made of the same materials. However, the wide lot-to-lot variation in those materials limits the use of such mockups for cigarette testing over a long period of time and by different laboratories.

- A valid and reliable measurement method is needed to determine that a cigarette is less ignition-prone. It is also important to collect information on cigarette-initiated fires to determine how successfully future cigarettes perform.

- The manufacture of less fire-prone cigarettes may require some advances in cigarette design and manufacturing technology.

- No cigarettes were tested for their acceptability to the smoking public. However, some physical characteristics which decrease a cigarette's propensity to ignite soft furnishings are incorporated individually in some commercial cigarettes. Combinations of all characteristics of the lowest ignition propensity cigarettes have not been incorporated in any commercial cigarettes.

- The overall effects of the cigarette modifications considered may result in only small changes in the price of cigarettes, unemployment, health care costs, life expectancy, and the financial status of the affected industries and professions. This conclusion involves a number of broad but necessary assumptions.

- The per puff tar, nicotine, and carbon monoxide yields from some of the least ignition-prone experimental cigarettes were within the ranges of yields from the best-selling commercial cigarettes. These cigarettes have a significantly higher resistance to puffing and a marginally lower number of puffs than do current commercial cigarettes. The toxicity of smoke from a future low ignition propensity cigarette needs to be addressed, as would the smoke from any substantially modified commercial cigarette, before its introduction into the marketplace.

The Technical Study Group recommends the following technical activities be pursued:

- A standard test method is needed to determine cigarette ignition propensity. Such a method should be developed as soon as possible and validated using the current set of experimental cigarettes.

- Performance data for current market cigarettes should be generated using the new test method. These data could then be compared to future year cigarette performance.

- A study to collect baseline and follow-up data about the characteristics of cigarettes, products ignited, and smokers involved in fires should be designed and implemented.

- Systematic knowledge should be developed (from existing or new sources, as appropriate) on (a) changes in the toxicity of smoke and resultant health effects from modified cigarettes, and (b) societal costs of injuries from cigarette-initiated fires.

- Both the laboratory studies on and computer modeling of ignition physics should be continued to develop a valid, user-friendly predictive capability. This would enable inexpensive screening for ignition propensity of future cigarette concepts. (The authors of reference 19 have offered more detailed recommendations for further research.)

Table 1. Description of Experimental Cigarettes

No.	Tobacco	Tobacco Density	Paper Porosity	Citrate Added	Circumference (mm)	Second Paper Wrapping[c]
101	Burley	High	Low	Yes	21	No
102	Burley	High	Low	No	21	No
103	Burley	High	High	Yes	21	No
104	Burley	High	High	No	21	No
105	Burley	Low	Low	Yes	21	No
106	Burley	Low	Low	No	21	No
107	Burley	Low	High	Yes	21	No
108	Burley	Low	High	No	21	No
109	Flue-Cured	High	Low	Yes	21	No
110	Flue-Cured	High	Low	No	21	No
111	Flue-Cured	High	High	Yes	21	No
112	Flue-Cured	High	High	No	21	No
113	Flue-Cured	Low	Low	Yes	21	No
114	Flue-Cured	Low	Low	No	21	No
115	Flue-Cured	Low	High	Yes	21	No
116	Flue-Cured	Low	High	No	21	No
117	Burley	High	Low	Yes	25	No
118	Burley	High	Low	No	25	No
119	Burley	High	High	Yes	25	No
120	Burley	High	High	No	25	No
121	Burley	Low	Low	Yes	25	No
122	Burley	Low	Low	No	25	No
123	Burley	Low	High	Yes	25	No
124	Burley	Low	High	No	25	No
125	Flue-Cured	High	Low	Yes	25	No
126	Flue-Cured	High	Low	No	25	No
127	Flue-Cured	High	High	Yes	25	No
128	Flue-Cured	High	High	No	25	No
129	Flue-Cured	Low	Low	Yes	25	No
130	Flue-Cured	Low	Low	No	25	No
131	Flue-Cured	Low	High	Yes	25	No
132	Flue-Cured	Low	High	No	25	No
201	Flue-Cured	Low	Very Low	No	21	No
202	Flue-Cured	Low	Very Low	No	25	No
203	Flue-Cured	Low	Very Low[a]	No	25	No
204	Flue-Cured	Low	Very Low[b]	No	25	No
205	Flue-Cured	Low	Very Low[a,b]	No	25	No
206	Flue-Cured	Low	Very Low	No	25	Yes
207	Flue-Cured	Low	Very Low[a]	No	25	Yes
208	Flue-Cured	Low	Very Low[b]	No	25	Yes
209	Flue-Cured	Low	Very Low[a,b]	No	25	Yes

[a] Electrostatically perforated to "high" permeability after manufacture.
[b] Embossed (to separate the burning tobacco from the substrate)
[c] Two paper layers; inner wrap is extremely porous.

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Table 2. Ignition Propensities of Selected Test Cigarettes [19]

	Designation	No. Ignitions in 20 Tests	%
Experimental Cigarettes	201	0	0
	106	1	5
	202	2	10
	130	4	20
	114	4	20
	105	6	30
	113	6	30
	108	7	35
	122	7	35
	129	10	50
	107	11	55
	120	20	100
	127	20	100
Least Ignition-Prone Commercial Cigarettes	2	12	60
	1	16	80
Typical Ignition Propensity Commercial Cigarettes	3	18	90
	6	20	100